

c. Amendments to Claims

1. (Currently amended) A system for monitoring or imaging a sample, comprising:

an optical interferometer comprising a measurement arm, a reference arm, and an optical splitter, the arms being coupled to receive light from the optical splitter and to output light, the measurement arm being configured to output light that a portion of the interior of the sample produces in response to being illuminated by the measurement arm, the interferometer being configured to interfere the light outputted by the arms, one of the arms having an acousto-optical modulator to frequency shift light therein; and

a detector configured to ~~receive~~ make a measurement on the interfered light and to use the measurement the received light and a signal representative of the frequency shift caused by the acousto-optical modulator to determine a speed of the depth-
~~dependent quantity characterizing a portion of the interior of the sample.~~

2. (Cancelled)

3. (Currently amended) The system of claim 1, wherein the detector is configured to use the interfered light to determine ~~quantity is representative of a signed displacement of the portion of the interior of the sample.~~

4. (Currently amended) The system of claim 2_1, further comprising:
an optical source coupled to transmit light to the measurement and reference arms and capable of producing light with a coherence length of less than 1 centimeter.

5. (Currently amended) The system of claim 2_1, further comprising:
an optical source coupled to transmit light to the measurement and reference arms and capable of producing light with a coherence length of less than 1 millimeter.

6. (Currently amended) The system of claim 2_1, wherein one of the reference arm and the measurement arm has a variable optical path length.

7 – 14. (Withdrawn)

15. (Currently amended) A process for monitoring a sample, comprising:
transmitting light to measurement and reference arms of an interferometer, the
measurement arm being configured to illuminate the sample with light;
acousto-optically frequency shifting light in one of the reference arm and the
measurement arm;

collecting light from the measurement arm in response to the light scattering off a
portion of the interior of the sample; ~~and~~

interfering light from the reference arm with the collected light; and
determining a speed of the portion of the interior of the sample from a
measurement on the interfering light and a signal representative of the performed
acousto-optical frequency shifting.

16. (Currently amended) The process of claim 15, further comprising:
determining ~~one of a velocity and~~ a signed displacement of the portion of the
interior of the sample based on the a measurement of the interfering light.

17. (Original) The process of claim 15, wherein the transmitted light has a
coherence length of less than 1 centimeter.

18. (New) The system of claim 3, wherein the detector is configured to determine
the speed as a function of depth in the sample.

19. (New) The process of claim 15, wherein the determining step finds the speed
as a function of depth in the sample.